

OPERATIONAL PLAN

COMPOST FACILITY: ENSO ONE

FACILITY ADDRESS: 2701 HAINDL OKC, OK 73129

PERMIT #: 3555065

FACILITY CLASS: CLASS III, TIER III

HOURS OF OPERATION: 8:00AM – 5:30PM MONDAY - FRIDAY

EMERGENCY CONTACT INFORMATION:

ENSO SOLUTIONS OFFICE 405-493-9392

MATTHEW GOLLADAY 405-323-7762

JUSTIN SMALL 405-795-0256

1. EMERGENCY ISSUES

At all times, if any odors, vectors, contact water or storm water are recognized notify Management immediately. Management implement emergency mitigation tactics after identifying the location and cause of the issue. Management will prepare an incident report and contact the DEQ to notify of the issue after mitigation. Fires shall be put out immediately by using one of the fire extinguishers located in accordance with the fire marshals' standards and requirements. After the fire has been mitigated, Management shall be notified so they can contact the DEQ and prepare an incident report.

2. ACCESS CONTROL

Access controls shall be maintained in accordance with 252:515-43-58(a) of the ODEQ requirements. The current operational guidelines are as follows.

At the end of the day, the gates to enter the processing facility approach (driveway, entrance, etc.) shall be closed and locked. The metal fence will eliminate unnecessary and unlawful dumping. There will be someone on site at the facility beginning at 8:00am until 5:30pm and monitored during off hours via station monitored motion activated cameras.

3. SIGNAGE

Signage shall be maintained in accordance with 252:515-43-58(b) of the ODEQ requirements. The current operational guidelines are as follows.

As long as Enso Solutions LLC is operating, there shall be a visible, clean, and aesthetically pleasing sign outside of the building. The sign is located on the NE corner of Building B (2701 Haindl). Sign will be maintained by Management and will be repaired within 48 hours of noticing any issues with the

signage (graffiti, vandalism, broken, etc.). At the entrance of the facility, there is a sign showing the following.



- a. NAME OF THE FACILITY
- b. PERMIT #
- c. FACILITY CLASS
- d. HOURS OF OPERATION
- e. EMERGENCY CONTACT INFORMATION

4. BUFFER ZONES

Buffer zones shall be maintained in accordance with 252:515-43-58(c) of the ODEQ requirements. The current operational guidelines are as follows.

All feedstock shall never protrude outside of the enclosed processing facility unless in an enclosed bin for transport, inside a compost bin, or another manner that is considered secure. No feedstock shall come within 50 feet of the any adjacent property. *Waivers on file for adjacent properties that do not include a built-in buffer of 50 feet, which does not in any way allow for feedstock to unnecessarily encroach on that 50 feet requirement.

5. RECEIVING AREAS

Receiving areas shall be maintained in accordance with 252:515-43-58(d) of the ODEQ requirements. The current operational guidelines are as follows.

- a. Enso Trucking: All Enso Solutions trucks shall enter the property off of SE 25th street and report directly to the processing facility for unloading. Unloading will be identified as TRUCK RECEIVING AREA, via signage & employee training, as the #2 garage door (Middle garage door of the Northeast side of the processing facility). This is the ONLY area that employees may bring material. If inclement weather at the time of drop off, truck shall make all efforts to back the tailgate through the garage door so that feedstock will not be in the elements.

- b. Customer Drop Off: Customers will have the ability to bring their bins to the facility for processing. Customers doing so will be required to show (Enso will take a copy) their transport license provided by OMMA. Customers without proper OMMA license will be denied service until documentation is provided. All customer drop offs will enter off of SE 25th street and enter one of the two garages facing EAST (IDENTIFIED CLEARLY as CUSTOMER RECEIVING AREA - completely separate and different area than trucking drop off – facilities are connected by a concrete pathway – Currently identified with two traffic cones). Employees will greet the customer, check documentation, weigh material, require a signature to verify drop off/weight, and provide the customer with a receipt. All material dropped at the customer drop off zone will be immediately moved to processing area to begin the sorting stage of the process.

6. PROCESSING AREA

Processing areas shall be maintained in accordance with 252:515-43-58(e) of the ODEQ requirements. The current operational guidelines are as follows.

The processing area is identified the entire warehouse and shall remain the processing area. This area shall be maintained in accordance to DEQ 252:515-43-58(e) and according to OSHA standards with proper signage. No product shall be stored for longer than 48 hours without being processed.

7. FINISHED PRODUCT

Finished compost shall be maintained in accordance with 252:515-43-58(f) of the ODEQ requirements. The current operational guidelines are as follows.

After the compost has fully been cured, it will be bagged and stored on site and/or taken to a landfill (process will be modified once a soil amendment is achieved). If the composted material remains on site, it must be properly bagged and sealed and not stored on site for longer than 12 months per DEQ Guidelines. Enso Solutions policy will be that it is not stored on site longer than 6 months to avoid accumulation of product and potential occupational hazards.

8. COMPOST STANDARDS

Enso Solutions composts by using the in-vessel method for a minimum of 14 days to ensure the feedstock being composted is allowed to fully cure prior to storage, disposal, or distribution. Enso will not recirculate contact water at this time. All composting vessels will be placed on an all-weather pad (concrete pad & indoors) to ensure no contact water leaks onto the processing facility floor to prevent trip hazards and/or other potential issues. Monthly material testing will be sent to Midwest Labs (Omaha, NE) and/or Oklahoma State University Agricultural Soil Lab. Testing will be completed for THC content along with heavy metals and other required markers. Testing for THC content is completed by Verde Labs, a licensed cannabis test lab in Edmond, OK.

9. COMPOSTING EQUIPMENT

- a. Composting Equipment Specs

Earth Flow EF-20-IM System Specifications

Manufacturer:	Green Mountain Technologies
System Name:	Earth Flow
System Version:	EF 3.4
Model #:	EF-20-IM
Overall Dimensions:	20'L x 8'4" W x 9' 6"H (High Cube)
Capacity:	20 yd ³
Discharge Door:	Double Door in the back at discharge end with hinges
Load Doors:	Double Polycarbonate Doors on load end
Electrical Service:	3 phase power
Electrical Panel Location:	Mounted on the wall adjacent to Vessel (right side of unit, when facing the load end)
Included Features:	Insulation Package - Walls, ceiling, floor Positive Aeration System Moisture Addition System Spare Parts Package Replacement Bolt-on Auger Flighting (set of 3)
Auger Specifications:	14" Dia SS Auger Assy 54" long Bolt on removable 3/8" SS flights with teeth, 3 tabs per flight 2 1/2" SCH 80 SS Pipe 2 layers 1/4" CS Flighting
Motor Specifications:	5 HP, Helical Inline Gearmotor, 1770 RPM In, 72 RPM Out Brother 1/2 HP 208/230/460V Flange Mount Side to Side Motor Brother 1/4 HP 208/230/460V 60HZ End to End Foot Mount Motor
Drive Chains:	#60 SS for Side to Side track #60 SS for End to End Track #60 SS for Gear Reduction
GMT Control Panel/VFDs:	2 each Hitachi 1/2HP, 230V, 1 phase 1 each Hitachi 5HP, 230VAC, 1 phase
Positive Aeration System:	Fuji Electric VFD41S 2.2 HP 230V 110 Max CFM Regenerative Blower
Exhaust Blower:	Fantech HP220 (2 blowers)
Biofilter:	Pile-Based Biofilter

b. Composting System Figures



Figure 1: Exterior photo of Earth Flow on Enso Solutions site

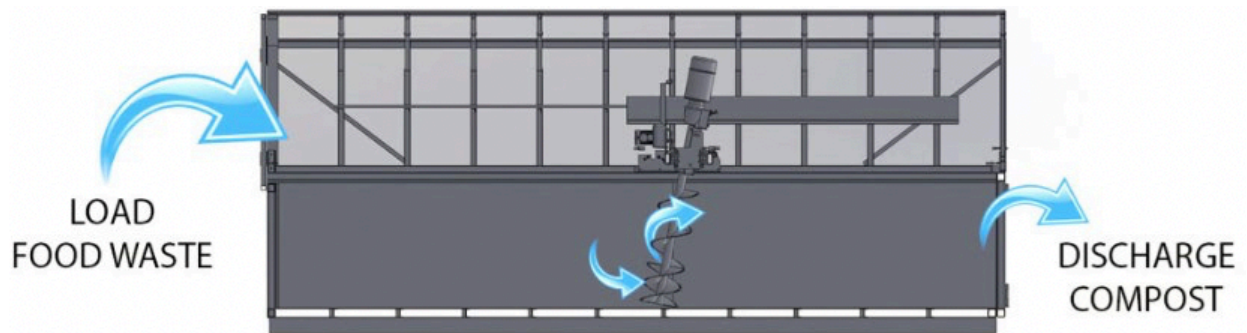


Figure 2: Diagram of how machine moves through machine



Figure 3: Auger system inside compost vessel – pre operations (Enso's actual machine)

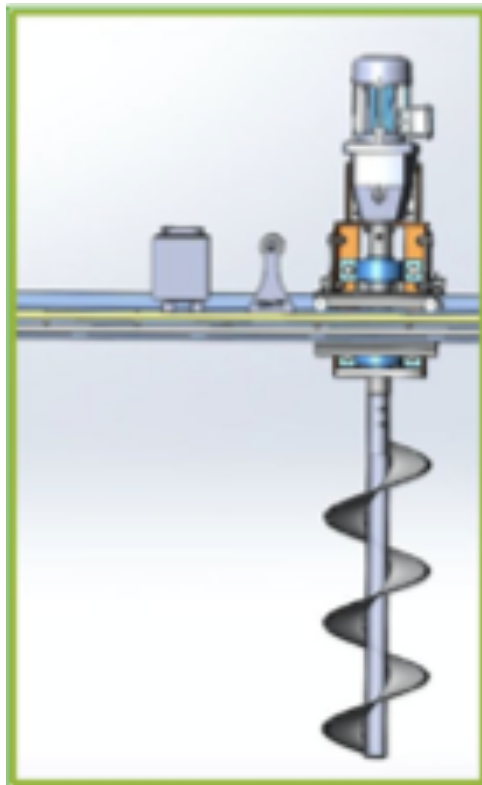


Figure 4: Auger Design of Earth Flow



Figure 5: Auger moving through compost in machine



Figure 6: control panel of Earth Flow



Figure 7: Inside vessel empty of showing insulation, etc.

c. Composting System (In Vessel) Process

See Appendix A: Earth Flow Intermodal Operational & Maintenance Manual

d. Post Composting Curing Process

The Earth Flow composting system is designed to thermophilically compost biodegradable feedstocks at 120-140 deg F for 14-21 days assuming an appropriate recipe. Under these conditions, compost exiting the Earth Flow system will be ready for non-aerated curing with minimal management. Once the compost exits the Earth Flow system, it will be cured for an additional 25 to 45 days inside the processing facility.

10. COMPOSTING PROCEDURES

Enso Solutions shall compost all feedstock using the in-vessel method.

- a. The material will be sorted. After sorting, the material will be placed inside of the vessel to begin the composting process. The composting vessel includes an automated auger (that can be manually controlled via joystick) that is built to grind up any material exceeding the 1-inch recommended size for composting.
- b. Up to 50% of non-cannabis material will be placed inside of the vessel along with the cannabis waste.
- c. Accelerants will not be added to the process. Enso does not use any accelerants to increase the internal temperature of the compost. Enso will only use organic methods of increasing the temperatures including additional feedstock (Carbon/Nitrogen), aeration, and water to increase the temperatures if necessary.
- d. Close monitoring of the compost vessel must occur twice daily (morning and afternoon), the morning shift will monitor the temperatures and humidity in accordance with OAC 252:515-43-62. The morning crew will document all of these steps, so that the afternoon shift knows exactly where the vessel stands in the composting cycle. The afternoon shift will be in charge of implementing additional action steps to keep the compost process moving forward.

I certify that all of the information herein is true and accurate.

Matthew Golladay, President – Enso Solutions LLC



Appendix A:



Intermodal Vessel Earth Flow Compost System Operations and Maintenance Manual

Revised: October 2019 Prepared By:

Green Mountain Technologies

5350 McDonald Ave Bainbridge Island, WA 98110 Copyright 2019

TABLE OF CONTENTS

DESCRIPTION OF THE EARTH FLOWTM 4

EARTH FLOW OPERATIONS 7

EARTH FLOW MAINTENANCE AND INSPECTION 13

THE COMPOST PROCESS 19

APPENDICES: COMPONENT MANUALS

Warning! Machine starts automatically. Before entering the interior of the vessel, ensure that power to the auger and gantry motors is appropriately locked out.

Description of the Earth Flow™

The Earth Flow™ is a fully enclosed, continuous feed, compost system designed and manufactured in the U.S. by Green Mountain Technologies. The distinguishing feature of the Earth Flow is the inclined mixing auger that is mounted on a movable gantry. The key benefit of this design is its propensity to chop, mix, aerate and move the material from the loading to the discharge end using a programmable control system. The patented technology moves large quantities of material with much less electrical power than other commercial composting technology.

The Earth Flow is comprised of the following major components described in detail below:

Vessel

The Earth Flow is a stainless-steel vessel (with a layer of spray foam insulation for cold climates). Each unit is equipped with a loading and discharge door. A greenhouse superstructure forms the roof of the vessel and encloses the compost environment. The sloped roof sheds rainwater to protect the compost and mixing assembly from precipitation. The process air inside the greenhouse is collected by a fan and directed to a bio-filter to control odors associated with composting.

The following terminology applies to this Earth Flow installation:

- The Load End of the vessel is the end of the vessel into which new feedstocks are added.
- The Discharge End of the vessel is the end of the vessel from which finished product is removed. When standing at the load end of the vessel, facing into the vessel,
- The vessel rail on the left is understood as the Left Side of the vessel.
- The vessel rail on the right is understood as the Right Side of the vessel.

Auger-Gantry Assembly

The Earth Flow contains a vertically mounted stainless-steel auger attached to the movable gantry. A 5 hp electric gear motor powers the 14" wide stainless-steel auger. The auger lifts the compost from the base of the vessel and pulls it upward, simultaneously mixing and aerating the compost. Serrated edges on the auger flighting shred and break up feedstocks as they decompose.

The motor and auger are attached to a travel car which moves side to side on the gantry beams by fractional gear motors and chain drives. The gantry is mounted on rails which allow the gantry to move from the load to the discharge ends of the vessel. A gear motor coupled to a drive shaft with sprockets over the rails, drives the end-to-end motion. Two fixed chains mounted above the rails are picked up by the drive sprockets pulling the gantry to the front or back of the vessel. The motion is controlled by proximity switches which stop the gear motor when the travel car reaches the end of the gantry and then reverses the drive motor sending the travel car back in the other direction (see Figure 1).

Figure 1: Gantry-mounted auger.

Chain Drives

There are two separate chain systems that move the auger carriage around the Earth Flow:

The end to end chain involves two pick-up chains that run along the length of the vessel. The end-to-end chain adjusters must be adjusted together to make sure that the carriage stays square to the long dimension of the vessel.



The side to side chain is a loop that attaches to the travel car as shown below. The chain slack is taken up by a roller tensioner.

Earth Flow Control System

The control system is responsible for stopping, reversing and determining the pattern that the auger moves inside the vessel. There are two panels comprising the control system; the Variable Frequency Drive (VFD) panel, which houses the motor controllers, and the Control Panel, which houses the programmable logic controller (PLC) and user interface (see Figure 2). The Control Panel will turn on the mixing system using a programmable timer cycle as well as the push button switches. Refer to the Controller O&M Manual for more information on programming functions.

Figure 2: Control panel and variable frequency drive enclosures.



The Variable Frequency Drives (VFD)

Each motor is regulated by a VFD which acts as the motor starter. The VFD will also allow the motor direction to reverse as well as adjust the motor speed. Most of the VFD commands are sent from the PLC to the VFD based on the programming functions. The VFD speeds are set by the manufacturer but can be adjusted by installer/operator. The auger should always be running at top speed to clear material away as it cuts through the compost. The speed of the side-side and end-end motors determine the shape of the pattern. The end-end drive speed determines how long it will take for the auger to complete a mix cycle. Speeding up the end-to-end drive will allow the Z-pattern to become wider and reduce the amount of mixing with each pass.

Positive Aeration System

The Positive Aeration System provides pressurized air flow through perforated tubing around the perimeter of the vessel floor. The air flow is sufficient to boost oxygen levels and assist with drying.

Moisture Addition System

This Earth Flow is installed with a Moisture Addition System that allows water to be added in the Earth Flow vessel directly where the auger is mixing. This can be useful particularly during the summer to ensure compost does not become overly dry. This system attaches to a garden hose using a standard fitting on the south side of the vessel.

Earth Flow Operations Key Operations Requirements

IMPORTANT: In order for the Earth Flow system to operate smoothly (and for the GMT warranty to remain valid), the client shall:

- Complete the tasks listed in the attached Earth Flow Maintenance and Inspection Schedule.
- Avoid overloading the Earth Flow system. Avoid getting compost onto the side rails, into the auger bearing or onto the gantry. This can damage the system.
- Avoid placing long fibrous materials (such as rope, tall weeds, bioplastic bags) in the system. These can become wrapped around the auger and can damage the system.
- Avoid adding rocks, branches or other large items into the system. These could damage the system.
- Avoid adding sand or soil into the system. This will prematurely wear the auger flighting.
- To prevent risk of fires from sparks or spontaneous combustion, maintain a minimum compost moisture content of at least 35% in the Earth Flow system, particularly during hot weather.
- Keep the aggregate bulk density of the compostable mix in the Earth Flow below 900 lbs/yd (or 4.5 lbs/gallon). Therefore, a full 5-gallon bucket of new feedstocks should weigh less than 22.5 lbs.

Loading Compostable Materials into the Earth Flow

Make sure the mixing system is off and away from the load end of the vessel. Remove the chains from the load end of the vessel. Feedstocks can now be safely added to the vessel.

WARNING: NEVER reach or lean into the Earth Flow through the loading doors while the auger is running! Be careful to protect/remove items such as loose fitting clothing, long hair or scarves that could get caught in the auger mechanism.

Once the vessel is full, make sure that the material does not stack up higher than 6" below the edge of the steel wall to prevent material piling onto the rails, chain drives or into the auger-gantry mechanism. Use a shovel to periodically knock away compost mix that accumulates in the corners on the load end beyond the reach of the mixing auger.

Mixing the Earth Flow During Loading

When new feedstocks are added to the Earth Flow, they should be mixed as soon as possible to accelerate the composting process.

The Mix Pattern Switch (see Figure 3) has three settings:

- Load – Mixes the Load End of the Vessel Only
- Mix – Mixes the Entire Vessel
- Dump – Mixes the Discharge End of the

Vessel Only

Turn the Mix Pattern switch to Load and press the Start button. The auger will move from the mid-point of the vessel to the load end to level and mix the new material as it is added to the load end.

Automatic Mixing of the Earth Flow

Figure 3: Control Panel.



The Earth Flow will mix the compost on a regular timer by setting the Cycles Switch on the control panel. The Cycles Switch has three settings:

- Auto 1 - mix once during the night
- Auto 2 - mix twice during the night
- Manual - manual mode, does not automatically mix at all

Once you are complete working with the Earth Flow, return the Mix Pattern switch to the desired mix pattern after the loading process is complete. The selected pattern will be run at night. Refer to the Controller O&M or contact GMT for instructions on selecting the start times or changing the timer settings.

Manual Mixing of the Earth Flow

The auger motion can be controlled by the joystick on the control panel. Turn the Cycles Switch to Manual and start the auger. The positioning motors will move in response to the manipulation of the joystick. The joystick can also be used to simulate the triggering of a proximity switch to stop the motion of the carriage and reverse its direction. Here is how the joystick directs the positioning of the auger (these directions assume you are standing at the load end of the vessel looking into the vessel):

- Moving the joystick to the Left moves the auger to the left side of the vessel.
- Moving the joystick to the Right moves the auger to the right side of the vessel.
- Moving the joystick to the Back moves the auger to the discharge end of the vessel.
- Moving the joystick to the Front moves the auger to the load side of the vessel.

Refer to the Controller O&M for more information.

To ensure automatic operation at night, return the Cycles Switch to Auto 1 or Auto 2 after Manual operation.

Warning: NEVER reach into the Earth Flow while the auger is running!

Checking Moisture Content

Check the moisture content using the 'wrung out sponge' test. Compost should have a moisture content of 40-65%. This is roughly equivalent to a damp but mildly wrung out sponge. There should be water in the compost but it shouldn't be saturated. The compost should be evenly moist. Here's the test:

1. If moisture comes out when you simply pick-up a handful, the mix is too wet. Bulking agent should be added.
2. If no moisture comes out when you squeeze a handful or if the compost is dusty and falls apart when squeezed, this indicates that your compost is too dry. You can add water to increase moisture content.
3. If a small amount of moisture drips or trickles out when you squeeze a handful, this indicates an appropriate amount of moisture.

It is also possible to measure the moisture content of the compost directly.

To do this, collect one or more representative samples of the compost, enough to equal about 1 cup of material per sample. Weigh this sample (separating out the tare weight of the plate or container). Then dry this sample in a microwave or oven. Once the material has been dried, reweigh the sample (again subtracting any tare weight). Continue drying the sample until the weight of the sample does not continue to drop. The % moisture content of the sample by weight is then:

Sample Wet Weight – Sample Dry Weight Sample Wet Weight

Caution: Do not let compost drop below 35% moisture because decomposition will be slowed and **material that raises dust when mixed introduces a risk of explosion or fire**. Extremely low moisture levels are most likely in hot, dry weather. The Moisture Addition System provides automated rewatering of the compost.

Checking the Temperature

Check the temperature of the compost using the stem thermometer, included with the system. Optimal temperatures for hot composting are typically 50-60°C (120-140°F). However, optimal temperatures depend upon process and product goals. Documentation of compost temperatures is highly recommended in order to verify pathogen reduction and track the composting process.

Aeration

With the Positive Aeration System (PAS), forced air helps to boost oxygen levels in the compost. Forced air increases the oxygen content in the compost and speeds thermophilic decomposition while reducing odors. Forced air can also cool and evaporate moisture. In many circumstances, operating the PAS 50% of the time produces good results (15 min on/15 min off).

Unloading Compost

There are several signs that compost is ready to exit the Earth Flow system. The compost will turn consistently dark in color and temperatures will drop and not rebound due to mixing. The texture will be homogeneous. The product will have a crumbly consistency and an earthy smell.

The typical retention time in the Earth Flow for horse manure and bedding is 10- 14 days. Composting in the Earth Flow will substantially reduce the volume of the material.

Compost can be stored in the Earth Flow vessel. Compost does not have to be removed until the material is stacked up to the top of the discharge door.

NEVER reach into the Earth Flow through the discharge door while the auger is running!

Maintenance & Inspection

See the attached Maintenance & Inspection Checklist for a detailed inspection and maintenance schedule.

Lockout/Tagout Procedure

Before performing any maintenance on the mechanical system or the interior of the vessel, the power to the auger and gantry motors should be properly locked out to prevent injury. The breakers servicing the VFD's should be turned to the off position and the service panel door locked out prior to commencing work. The control panel start button should be pressed to check that the system is disabled prior to entry. Please refer to the relevant Lockout/Tagout regulations for details.

Confined-Space Procedure

As long as the doors are open on the Earth Flow, the Earth Flow does not qualify as a permit-required confined space. However, if the Load End and/or Discharge End Doors are closed, entering the vessel may qualify as a permit-required confined space. If this is the case, the relevant Confined Space regulations should be followed. Avoid working on the interior of the vessel unless both the load and discharge doors are open as well as the maintenance ports on the sides of the vessel.

Start-Up Phase – Inspections and Adjustments

Within the first 2-3 months of use of the Earth Flow, the system components become accustomed to being under load. Drive chains stretch and bolts/nuts that were tight in the factory may work themselves loose when placed under load.

During this start-up phase, more frequent monitoring of the Earth Flow is required to identify any components that need tightening or adjustment.

Warning: Always properly lock-out the system before entering the vessel to do inspections, adjustments or maintenance.

The following sections provide more details on crucial preventative maintenance activities.

End-to-End Chain Adjustment

The end-to-end drive chains will periodically need adjustment. The end-to-end chain is the longest chain in the vessel and is therefore more prone to stretching. There are chain tension adjusters on the discharge end of the intermodal vessel.

If an end-to-end chain is not sufficiently tight, the chain may jump over the teeth of the sprocket and get out of sync with the other side. Also, if the end-to-end chains are not equally tensioned, the carriage can become out of square with the vessel. Both of these issues could disable or damage the system.

To properly adjust the end-to-end chains,

1. Using auto or manual mode, relocate the carriage to within 1-4 feet from the discharge end of the vessel.
2. Using the joystick in manual mode, move the carriage a couple of inches toward the load end of the vessel. This will tension the chain between the carriage and the load end of the vessel. The chain between the carriage and the discharge end of the vessel will be relatively slack. Then stop and lock out the system.
3. Ensure that the carriage is “square to the vessel”. This means that the left and the right sides of the carriage should be an approximately equal distance away from the chain tensioner brackets on the discharge end. Measure the distance between the left most point on the carriage rail and the chain tensioner on the left. Repeat this for the right side of the carriage (see Figures 4 and 5).

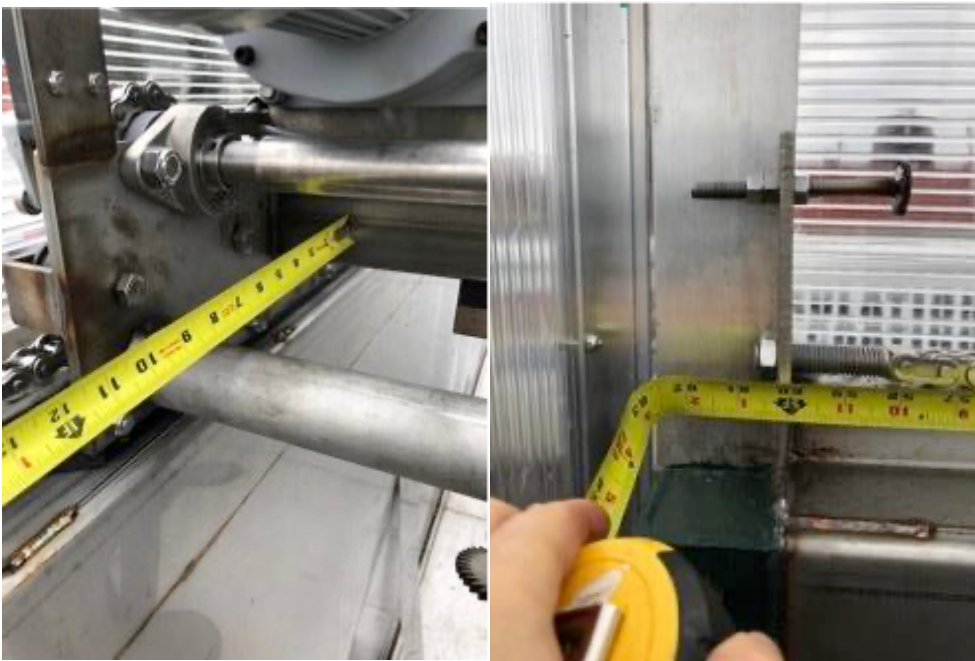


Figure 4: Measuring the Distance of Carriage Rail to Tensioner on Left

Figure 5: Measuring the Distance of Carriage Rail to Tensioner on Right

If the carriage is out of square, tighten the chain tensioner nuts with a wrench to bring the far side into square with the other side of the carriage.

Chains should also be inspected for over stretching. Chains that are over stretched have a tendency to kink and get stuck in a kinked position. If a chain becomes persistently kinked it is a candidate for replacement in this area.



Side-to-Side Chain Adjustment

The side-to-side chain must also properly tensioned (see Figure 6). When the top portion of the side-to-side chain is under tension (travel car is being pulling to the right side of the vessel), the taut portion of the chain should deflect 1-2" when applying moderate hand pressure and the bottom portion should not droop so much that it falls off the sprocket or kinks. When the top portion of the chain is slack (travel car being pulled to the left side of the vessel), the chain should not droop so much on top that the chain begins to wrap around the drive sprocket for the side-to-side motor. Remove excessive slack on the slack side of the chain that could cause the chain to bind up.

Figure 6: Side-to-Side Chain Tensioners.

Short Drive Chain Adjustment

The short drive chain (see Figure 7) turns the 1" drive shaft for the end-to-end motor. If this chain becomes loose, it can be tensioned by loosening the 1/2" bolts on the gearmotor with two 3/4" wrenches and sliding the motor up and retightening the bolts. A short pry bar can be levered against the cross tube to push up on the gear motor and tension the chain. It can be helpful to have one person hold the motor as high as possible while the other person tightens the bolts for securing the motor. Once properly adjusted, the chain should be snug and chain spanning the two sprockets should be firm.



Figure 7: Short drive chain.

Travel Car Underside Support Base

The travel car features a support base under the travel car that holds the travel car down to the carriage rails. This support base is faced with slide blocks that slide on the bottom side of the carriage rails. This support

ORIGINALLY DRAFTED FEB. 2020 - UPDATED ON 1-22-2021 - MG

base should be positioned such that the slide blocks are just touching the bottom of the carriage rails. The support can be adjusted by loosening the bolts securing the support base to the travel car and then adjusting the tensioner bolts until the support base slide blocks are just in contact with the bottom of the carriage rails. The slide blocks should not be compressing the carriage rails, they should be simply flush to the carriage rails. Once adjusted properly, retighten the bolts to secure the support base.

Proximity Switch/Flag Adjustment

The proximity switches determine how close the auger comes to the walls. Ideally the auger should come close enough to clean the compost off the walls and not leave an unmixed layer. The proximity switch should contact a metal flag and should stop the motor when the auger is approximately 1/2" from a wall. If the auger is too close or too far from the wall, use 9/16" wrenches to loosen the 3/8" jam nuts on the relevant metal flag and adjust the flag appropriately (see Figure 8).



Figure 8: Proximity Switch Flag Adjustment.

Auger Flighting Inspection and Replacement

The auger is constructed of bolt-on sections that can be replaced as the teeth wear (see Figure 9). The auger teeth will wear more quickly on the lower sections. The auger should be inspected every 6 months (or every 1 month if the feedstocks have abrasive materials such as sand). In order to evaluate the auger wear bring the auger to the rear of the vessel and turn off the auger. If the teeth on the lower section have worn to the point that 1/4" or less of the notch is left, then the section should be replaced.

Figure 9: Bolt-on auger flighting.

You will need a 3/8" allen wrench and a 3/4" socket or open end wrench. Remove the flat head bolt by holding the allen wrench and backing out the nut with the wrench.



Remove the section and replace with a new section. The sections are not perfectly formed and may require a little persuasion to align the new flighting with the bolt pattern.

Cold Climate/Winter Operations

The Earth Flow composting system is completely compatible with cold weather composting. Follow these guidelines to ensure efficient cold weather operations:

- If the weather is consistently below freezing, monitor the temperature of the compost more frequently to make sure that the temperatures remain well above freezing.
- Protect material about to be loaded from freezing.
- Do not operate the mixing system if the material appears to be frozen.

The Compost Process

Composting is a biological process of decomposing organic material into a humus- rich soil amendment. Composting happens naturally and we can find the humus- rich soil on forest floors. In scientific terms, composting is a microbe-based, aerobic, self-heating process. The compost mix consists of organic material that serves as a source of nutrients for the beneficial microbes, which do the work, and a porous woody material for gas exchange and thermal insulation. Owing to the insulating properties of the material and container, heat that is generated metabolically during composting is conserved within the system. This has the

effect of raising the temperature 120-150F, thereby speeding up the decomposition process. As the compostable materials are used up, temperatures decline and eventually return to ambient. The waste is biologically converted into carbon dioxide, water and a stabilized, nutrient-rich byproduct -- humus.

The microbes responsible for composting are various species of beneficial bacteria and fungi that are widespread in the environment. These are indigenous to such materials as soil, dust, vegetable matter, and wastes of all sorts. Special organisms are not required, though often one finds other soil organisms such as worms and sow bugs working their way into a compost system and contributing to the process. Optimal composting requires control of five primary factors that constrain the process of organic decomposition as detailed below.

Moisture Content

The proper moisture content for the best decomposition is that of a damp but partially wrung out sponge. The way to test this is to pick up a sample of compost material in your hand. If water readily drips from the material, the mix is too wet. If when squeezing the material, a small amount of water drips out, this indicates an appropriate amount of moisture. If when squeezing the material, no water drips out, it is too dry.

Metabolic heat generated by the microbes during decomposition will remove moisture by evaporation.

Caution: Do not let composting material drop below 35% moisture. **Overly dry compost that raises dust when mixed introduces a risk of explosion or fire.**

Extremely low moisture levels are most likely in hot, dry weather. Regularly check compost moisture levels during warm weather. If on the dry side, add water.

Mixing

The auger mixes and homogenizes the compost feedstocks. The auger “fluffs” the mixture to increase aeration and porosity, and also provides mobility for the beneficial microbes to more quickly surround and penetrate the nutrient particles for faster decomposition.

Carbon to Nitrogen Ratio

Carbon and nitrogen are required for bacterial reproduction. Carbon acts as an energy source while nitrogen and other micronutrients are the building blocks for cell growth. If there is an inadequate amount of carbon, nitrogen will escape as ammonia. If there is an inadequate amount of nitrogen the process will slow down. In addition, there will not be enough heat generated to kill off the harmful microbes. The desired C:N ratio is in the range of 20-40:1.

Aeration

Aeration refers to the movement of air through the compost matrix and the exchange of gases through the liquid layer on the decomposing matter. Air circulation is important in the process because the beneficial microbes breathe it in as they “work” to decompose. Proper aerobic conditions minimize odor issues; it is the

anaerobic conditions that cause the smells that we perceive to be malodorous: ammonia, putrescibles, sulfates, methane, etc.

The particle size distribution of the feedstocks is an important factor in aeration. A small particle size will increase the surface area while decreasing the amount of space between particles. The amount of air in the pore space of a mix is represented by bulk density. Lower bulk density mixes have more air and therefore are lighter.

Air moves through the pore space in the compost by two forces: convection and pressure. As air moves through the mixture, oxygen is exchanged with carbon dioxide and water to maintain aerobic conditions. Oxygen levels of 10% or greater are ideal in an aerobic compost process.

Temperature

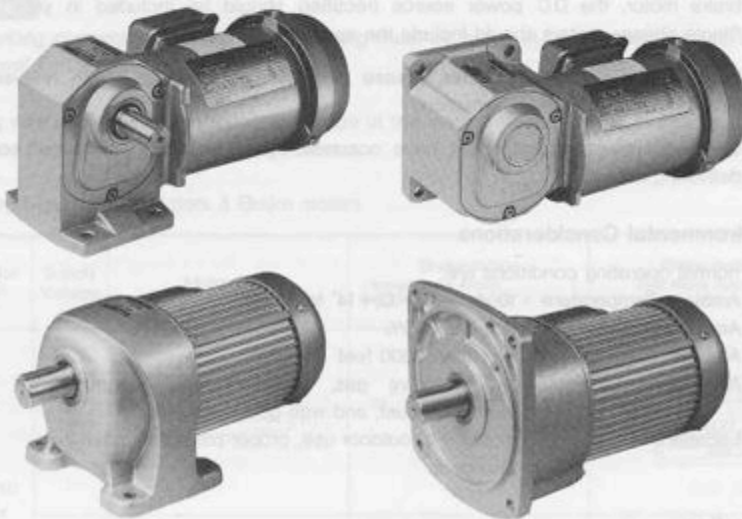
Heat is generated primarily by metabolism of biodegradable organic compounds. The insulated walls of the vessel and the insulating properties of compost will retain heat so that the compost stays within the optimal temperature parameters of 120°-140°F. Temperatures below this range slow the process down and temperatures above 145F decrease the variety and number of beneficial microbes and may increase odors. Temperatures should remain above 132 deg F (55 defc) for 3 days at some point in the process to kill pathogens. Most weed seed is inactivated at these temperatures, although a few species require temperatures as high as 155F.

Proper compost recipe and porosity determines the amount of heat generated once the ingredients are well mixed in the Earth Flow. The mixing frequency and aeration rate controls the rate of cooling. The more air that is drawn off the headspace the more rapidly the compost cools by a convection gradient between the hot air in the compost and the cooler air pulled into the headspace from the atmosphere. With the positive aeration system, a sufficient amount of air is blown into the floor of the vessel to increase oxygen levels and the rate of convective cooling.

BROTHER INTERNATIONAL CORPORATION
GENERAL INSTRUCTION MANUAL
INSTALLATION, OPERATION and MAINTENANCE

"GTR" SERIES INTEGRAL GEARMOTORS AND BRAKE GEARMOTORS

PLEASE READ AND SAVE THIS MANUAL



IMPORTANT NOTICE: BE SURE TO INSTALL AND OPERATE BROTHER GEARMOTORS IN ACCORDANCE WITH ALL APPLICABLE LOCAL AND NATIONAL SAFETY CODES.

Because of the possible danger to people and/or property resulting from improper use of power transmission products, it is important that these products be properly installed, maintained and operated within the limits of speed, torque and other load and environmental conditions as specified in the catalog and this instruction manual. Periodic inspections should be made to insure safe operation under the prevailing conditions. Proper guards and other suitable safety devices or procedures may be required but are neither provided by nor are they the responsibility of Brother International Corporation.

BROTHER INTERNATIONAL CORPORATION

GEARMOTOR /OEM DIVISION

200 COTTONTAIL LANE

SOMERSET, NEW JERSEY, 08875-6714

TEL(908)356-8880 FAX(908)469-4840

Thank you for purchasing this Brother gearmotor.

Please carefully read the following instructions for proper installation, operation and maintenance of your Brother "GTR" gearmotor.

Following these simple guidelines will help insure the years of trouble free operation designed into your unit.

1. Initial Checks

- 1) Unpack and verify that the nameplate information (model number, type, ratio (output speed), motor power, voltage, frequency, etc.) is correct for your application. If you ordered a brake motor, the DC power source (rectifier) should be included in your shipment. Single phases motors should include the appropriate capacitor.

If there are any discrepancies, please contact us immediately with relevant details including your ordering information.

- 2) Check for damage that might have occurred during shipping. If found, contact the delivering carrier.

2. Environmental Considerations

The normal operating conditions are:

- | | |
|------------------------|---|
| A. Ambient Temperature | 10° to + 40 °C(+14° to 104°F) |
| B. Ambient Humidity | less than 85% |
| C. Altitude | less than 3300 feet |
| D. Atmosphere | No corrosive gas, explosive gas, steam, or excessive dust, and with good ventilation. |
| E. Locations | Indoor (For outdoor use, proper protection must be provided). |

3. Mounting

- 1) Secure the gearmotor with the proper size bolts in all 4 mounting holes to a flat and vibration free mounting surface. (The mounting surface should be flat within 0.011 inches or 0.3 mm).
- 2) Because the gearmotor is grease filled and sealed it can be mounted at ANY ANGLE.
- 3) If you are using a brake motor, protection to avoid intrusion of water or dust must be provided as the brake portion is not totally enclosed.

4. Shaft Connections

- 1) Clean all machined shaft areas before attempting to mount components.
- 2) Be careful not to hammer or bang on the shaft(s) as this can cause damage to the bearings.
- 3) In the gearmotor is connected to the driven machine through a coupling, align the shafts as accurately as possible and use a flexible coupling.
- 4) If the gearmotor is connected with belts or chains, insure the shafts are parallel and that the sprocket or pulley is mounted on the gearmotor shaft(s) as close to the housing as possible. It also must be in line with the component mounted on the driven machine.

This alignment can be checked with a string or straight-edge across the faces of the mounted components.

Insure that the belts or chains are neither too tight nor too loose but are tensioned correctly.

5. LUBRICATION-MAINTENANCE FREE

All models of the Brother GTR gearmotors are shipped with the correct quantity of high quality synthetic grease. Under normal operating conditions and for the life of the drive, no additional grease or grease change is required.

6. ELECTRICAL CONNECTIONS

Note:

All wiring connections, including grounding must be made in accordance with all local and national safety codes.

Long wire runs may cause reduced voltage at the motor. Voltage drops in excess of 2% may reduce the starting torque of the gearmotor.

Wiring Diagrams for Motors & Brake motors

Motor HP	Supply Voltage	Motor Only	Brake motor (Normal Brake Action Reaction Time: 160ms ± 10ms)	Brake motor (Fast Brake Action Reaction Time: 10ms)
1/50 or 1/30 or 1/20 or 1/15 or 1/10 or 1/6	Single Phase 115			
	Three Phase 208/230			
	Three Phase 460			

*Single Phase Motors with rated voltages above 200V have a "Brown" lead in place of the "Blue" lead.

Motor HP	Supply Voltage	Motor Only	Brake motor [Normal Brake Action Reaction Time: 160ms \pm 10ms]	Brake motor [Fast Brake Action Reaction Time: 10ms]
1/4 or 1/2 or 1	Three Phase 208/230			
	Three Phase 460			

The standard brake utilized in the Brother GTR gearmotor is a SPRING SET/POWER RELEASE type usually referred to as a "Fail Safe Type". The brake engages and holds loads under power OFF conditions and automatically releases when power is applied.

The above figures show two methods for wiring the brake and motor for either single or 3 phase power sources. Please note the difference in the "Brake Reaction Time" and choose the method best suited to your application.

Caution: For single phase Brakemotors

All Brother 115 volt single phase 1/50, 1/30, 1/20, 1/15, 1/10 and 1/6 HP motors, including brakemotors, are supplied with an internal automatic resetting thermal overload switch.

Should this internal overload switch be activated stopping current flow through the motor windings (and thus stopping the motor), current flow continues to the rectifier and to the brake coil.

This condition has the following consequences:

- 1) The brake will not "set" so the motor will coast and/or the load may backdrive through the gearmotor.
- 2) The brake coil may overheat because the motor fan no longer provides a cooling air flow.

It is strongly recommended that you supply and install a current sensing auxiliary contactor in the brake coil wiring circuit.

Please consult the factory if more information is desired.

Note:

- 1) (M): Motor, (B): Brake, (C): Capacitor, (M. S.): Magnetic Switch, (R. S.): Reversing Switch.
- 2) Caution: The DC power supply utilizes diodes and can instantly be damaged if incorrectly wired. Before energizing the system, insure the wiring is correct according to the proper wiring diagram as shown in this manual.
- 3) Brake Reaction Time refers only to the delay between switching and brake activation. It does not include the actual braking time.
- 4) For elevator or hoist type applications, "Fast Reaction Time" wiring method MUST be used.

FOR SAFE OPERATION

Before Initial Power-Up, Check the following:

- 1) The driven load requirements and Overhung Load (OHL) are less than the allowable values shown in the catalogs...
- 2) The Wiring is Correct...
- 3) Proper fusing and/or thermal relays are installed...
- 4) Proper Grounding of the electrical components...
- 5) Proper and secure mounting of the gearmotor to its mounting structure...
- 6) Proper installation and alignment of all shaft components...

After confirming the above, switch on the power at light load levels, gradually increasing to full load, while inspecting for abnormal noise, vibration, temperature rise, etc. Should any of these be present, immediately shut-down the drive and correct the problem.

OTHER CAUTIONARY NOTES

- 1) The motor surface temperature should not exceed 80°C (176 °F).
- 2) DO NOT "PLUG" REVERSE The Unit.
The motor should be allowed to come to a full stop before energizing for the opposite direction of rotation.

Troubleshooting Chart Gearmotor

Symptom	Possible Cause(s)	Corrective Action
Unit fails to operate at no load	No power	Check power supply and contact power company
	Blown fuse or open circuit breaker	Replace fuse or reset circuit breaker
	Loose connections	Make connections secure
	Defective switch	Repair or replace
	Stator winding is broken	Repair at an authorized location
	Single phase supply is connected to three phase motor or vice versa	Check terminal voltage and phases
	Capacitor is NOT connected (Single phase motor)	Connect capacitor correctly
Unit fails to operate at some load	Defective gear assembly, shafts or bearings	Repair at an authorized location
	Reduced voltage at motor	Check wiring length and size
	Overload operation	Reduce load
	Gears are worn	Repair at an authorized location

Symptom	Possible Cause(s)	Corrective Action
Unit runs hot	Overload operation	Reduce load
	Operation starts and stops too often	Reduce frequency of starting and stopping
	Voltage is too high or too low	Check voltage
	Defective bearings	Repair or replace
Excessive noise	Excess belt or chain tension	Adjust tension
	Excess overhung load	Reduce overhung load
	Continuous noise -- defective gears or bearing wear	Repair at an authorized location
	Intermittent noise -- defective tooth surface or gear catches foreign matter	Repair at an authorized location
Too much vibration	Incorrect installation or bolts are loose	Tighten bolts
	Gearing or bearing wear	Repair at an authorized location
Grease leaks	Housing bolts are loose	Tighten bolts
	Defective or damaged oil seals	Replace seals

Gearmotor with Brake

Symptom	Possible Cause(s)	Corrective Action
Brake does NOT work	Incorrect wiring	Check wiring
	Defective switch	Repair or replace
Brake does not work well or Braking time is too long	Foreign matter (oil, dust and so on) on friction disc	Clean thoroughly
	Friction disc is worn	Adjust or replace
	Load inertia is too large	Reduce load inertia
	Using "NORMAL" switching (160 ± 10ms)	Wire for "FAST" switching (10ms)
Motor won't run Motor won't run at full speed Motor runs too hot Thermal relay works Abnormal braking noise	Wrong brake or motor wiring	Check wiring
	Brake gap is too wide	Adjust brake gap
	Damaged rectifier	Replace
	Snapping or short in brake coil	Replace at an authorized location
	Incorrect wiring of switch	Check Wiring
Unit runs too hot	Brake cycles too often	Reduce frequency of braking or
	Load torque or load inertia is too large	Reduce load